

Anadromous Fish Restoration in Massachusetts Bay--Project Update 7-7-05

Part 1. Anadromous Fish Passage Enhancements

Progress Update:

The prioritized list of construction/repair projects for fish passage structures is nearing completion. Wrap-up meetings are scheduled for late May/early June 2005. Following prioritization, the cost/benefit analysis for each project will ensue and is expected to take several months. *MarineFisheries* will proceed with selected projects based on the costs of construction and/or repair versus the combined benefits of acreage of habitat restored, historical presence of a fish run, community support, water quality, and the reliability of adequate water supply.

In collaboration with the Town of Weymouth, *MarineFisheries* completed the first HubLine-funded fish passage enhancement project in January 2005. A swinging grate was installed over the bypass channel near the Back River fishway. The grate will prevent adult herring and rainbow smelt from entering the bypass channel and assist them in finding the fishway as they move upriver to spawn. The success of the gate will be evaluated by examining herring count data collected by the Town of Weymouth.

Evaluation of fish passage in the Charles and Neponset Rivers has been a primary focus of the Anadromous Fish Passage Enhancement Project in spring of 2005, as the success of the concurrent HubLine-funded American Shad Propagation Project depends on adequate passage for shad in these systems. In May 2005, *MarineFisheries* and a U.S. Fish and Wildlife Service fish passage engineer completed an initial examination of fish passage structures in the Charles River from the Charles River Locks in Boston upriver to the Cordingly Dam in Wellesley. Modifications and/or repairs are required at the six fishways within this area, some relatively minor and some more costly. Based on this initial assessment, creating a new breach for passage at the Bleachery Dam will likely take priority. Also, *MarineFisheries* is actively working with other agencies to establish fish passage in the Neponset River and contribute to the overall river restoration efforts led by the Massachusetts Riverways Program. In May 2005, *MarineFisheries* participated in a multi-agency meeting convened to discuss the Conceptual Site Model (The Johnson Company, Inc., Montpelier, VT) for restoration of the Neponset River. PCB (polychlorinated biphenyls) contamination immediately above the Walter Baker Dam, in the Braided Channel, and above the Tileston and Hollingsworth Dam will require significant remedial action (Breault et al. 2004). Consequently, *MarineFisheries* may seek to build temporary fish passage structures at the two dams until remedial actions have been completed. Passage at these dams would provide access to more than 17 miles of spawning habitat for American Shad.

Literature Cited:

- Breault, R. F., Cooke, M. G., and M. Merrill. 2004. Sediment quality and polychlorinated biphenyls in the lower Neponset River, Massachusetts, and implications for urban river restoration. U.S. Geological Survey Scientific Investigations Report 2004-5109.
- Reback, K., P. Brady, K. McLaughlin, and C. Milliken. 2004. A survey of fish passage in coastal Massachusetts, Parts 1-4. Massachusetts Division of Marine Fisheries Technical Report TR-15, 16, 17 and 18.

Part 2. Rainbow Smelt Propagation and Habitat Enhancement (Work will begin during FY-06)

Project Goals:

MarineFisheries will work closely with researchers from the Quebec Ministry of Fisheries in order to apply their successful propagation techniques for smelt to our rivers. This will be a continuation of work started under the "Up-Front" Mitigation monies, under which pilot studies are currently being conducted. *MarineFisheries* will also work with researchers at the University of New Hampshire to develop protocols

to mark the otoliths of larval smelt. In order to track the success of stocking efforts, it is necessary to be able to differentiate hatchery-spawned fish from naturally-spawned fish. Naturally-spawned fish will gradually become more abundant than hatchery-spawned fish over several years if the program is successful. The percentage of hatchery-reared fish will be estimated by examining a sample of returning adults each year for marks on their otoliths.

Part 3. American Shad Propagation

Progress Update:

Marine Fisheries and the USFWS began meeting early spring 2005 to create and finalize the 2005 Shad Propagation Action Plan. The objectives for this year are as follows: (1) obtain and assess the reproductive status of potential brood stock shad from the Essex Dam fish lift in the Merrimack River, Lawrence, MA, and locate active riverine spawning grounds, (2) establish successful rearing methods for fry that will promote the maximum possibility for survival to stocking, and (3) if feasible, produce and stock 3.5 million shad fry.

To observe American shad propagation in progress, and to gain necessary information for conducting culture in the Commonwealth, project personnel visited successful shad hatchery programs in April 2005. Specifically, *Marine Fisheries* met with experts from Harrison Lake National Fish Hatchery and King & Queen Fish Hatchery in Virginia, and the Joseph Manning Hatchery in Maryland. Modeled after designs at these facilities, a hatching battery and rearing tanks are currently being set up/constructed at the North Attleboro National Fish Hatchery, North Attleboro, MA. Although the Nashua National Fish Hatchery in New Hampshire was the original target for shad propagation, cold well water temperatures will prohibit culture at this location in 2005. To accommodate additional fry production, options for heating water at the Nashua hatchery will be explored for 2006. In addition to the ongoing construction in North Attleboro, temporary holding tanks for brood stock shad are being assembled at the Essex Dam on the Merrimack River.

In June, *Marine Fisheries* obtained potential brood stock shad from the Essex Dam fish lift and held them in tanks temporarily, while determining their reproductive status or “ripeness” for spawning. Ripe shad were identified and fertilized eggs were obtained and moved to the North Attleboro hatchery for hatching and rearing. In the future, *Marine Fisheries* will initiate the stocking of shad fry in the upper Charles River, but may postpone stocking in the Neponset River until water quality and fish passage issues are more adequately addressed. Prior to release, all fry will be immersed in an oxy-tetracycline bath to mark their otoliths (ear bones). Otolith marking will allow identification and quantification of hatchery origin shad in 3-4 years, when these fish reach maturity and return to spawn. Because marked shad fry surviving to maturity have shown high fidelity to natal rivers (Hendricks et al. 2002), *Marine Fisheries* expects a proportion of shad stocked into the Charles and Neponset Rivers to return to these systems as adults. Returning adults will be sampled and examined for marked otoliths. A successful restoration will be evidenced by the presence of a greater number of naturally spawned individuals as compared to hatchery spawned individuals.

Literature Cited:

- Hendricks, M. L. 1995. The contribution of hatchery fish to the restoration of American shad in the Susquehanna River. Pages 329-336 in H. L. Schram and R. G. Piper, editors. Uses and effects of cultured fish in Aquatic ecosystems. American Fisheries Society, Symposium 15, Bethesda, Maryland.
- Hendricks, M. L., R. L. Hoopes, D. A. Arnold, and M. L. Kaufmann. 2002. Homing of hatchery-reared American shad to the Lehigh River, a tributary to the Delaware River. North American Journal of Fisheries Management 22:243-248.